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ABSTRACT

This study was undertaken to examine the relationship between "Personality fitness" and academic achievement. One hundred seventy-five subjects from three educational levels--university, vocational technical institute, and high school--were administered the Eysenck Personality Questionnaire, the Raven's Advanced Progressive Matrices and an Information Questionnaire. It was found that personality dimension of intraversion had the highest correlation with academic performance in the university sample, especially for the "hard sciences" students. Ravens intelligence score was the best predictor for the vocational technical institute sample. Personality dimensions of neuroticism and psychoticism, as well as average number of study hours added differently to the multiple regression equations for the various samples. (Author)

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Personality and Academic Achievement in Three Educational Levels

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There has been an increasing research interest concerning the relationship between personality correlates and academic achievement. A significant number of studies in this area have reported findings based on the theory of personality advanced by Eysenck (1970). This theory proposes three putatively orthogonal personality dimensions designated extraversion-introversion, neuroticism and psychoticism. Extraversion-introversion and neuroticism have been postulated most frequently as contributing to academic performance. Recent review of major studies have concluded low but statistically significant correlations between these two personality variables and scholastic achievement (Jensen, 1973; Naylor, 1972). In general, there is a rather firm positive relationship between introversion and achievement in university setting (Entwistle and Entwistle, 1970; Entwistle and Wilson, 1970; Furneaux, 1962; Kelvin, Lucas and Ojha, 1965; Lavin, 1967; Lynn and Gordon, 1961). The relationship between neuroticism and college achievement is less well established. Furneaux (1962) found a positive relationship between neuroticism and educational achievement. Lynn and Gordon (1961) and Savage (1962) suggested a possible U - shaped or curvilinear relationship between the two; they reported that students who had moderate neuroticism scores did better than students who had high or low neuroticism scores. Other studies have reported negative

(Lavin, 1967) or non-significant relationship (Kline and Gale, 1971) between neuroticism and academic performance. Whereas psychoticism and educational success are concernd, no research is as yet available. Only recently, a formal instrument for the measurement of psychoticism was made available (Eysenck & Eysenck, 1972, 1975).

In attempt to develop a more thorough understanding of the nature of the personality dimensions in relation to academic performance, Eysenck (1972) has suggested the examination of two additional variables and reiterated the need for research clarification in this area. The first variable is that of personality fitness. Eysenck refers to personality fitness as the suitability of individuals with specific personality correlates for certain areas of academic study. He contends that "introverts are better adapted to the study of the 'hard sciences' (i.e., physics, mathematics, biology, etc.), extraverts to the fun and games of the social studies, languages, and arts generally." That is, extraverts who are studying in the "hard sciences" areas would be less adapted for this area of study than they would be for the study of the social sciences, languages, etc. This lessor degree of adaptation would be predicted to be reflected in the lower academic achievement of these students. The second variable Eysenck suggested was that of educational selectivity. This notion is particularly pertinent to the understanding of the effects of neuroticism on academic achievement. The degree of selectivity implied in the process of passing from one educational level to another (i.e. from primary to secondary and university, etc.) is believed to affect the relationship between neuroticism and achievement. Eysenck contends that the high neuroticism student population is made up of two distinct groups, one helped

by its high neuroticism, the other impeded. In the lower levels of education where little of the selection process is used, high neuroticism would show a negative correlation with achievement as those students who had difficulty coping with high levels of neuroticism would influence the results. At the higher educational levels, student whose high neuroticism adversely affects their academic performance are supposedly eliminated through the selection process; therefore, one would predict a positive relationship between neuroticism and achievement when the populations have become increasingly more selective.

Considering the complex nature of personaltiy in relation to academic performance, the notions of personaltiy fitness and educational selectivity seem to provide useful conceptualization to the problem of interest. However, research directly dealing with these variables has not been reported in the professional literature. The present study is undertaken to examine the hypotheses mentioned above according to Eysenck's theory. The relationships between all three personality dimensions (Extraversion-introversion, neuroticism and psychoticism) and academic achievement will be examined in relation to "personality fitness" and "educational selectivity." In addition, the influence of intelligence and study effort on achievement will also be studied.

Method

Subjects

The subjects were obtained from three distinct educational settings: university, vocational technical institute and high school in a middle-sized community in Wisconsin. The total sample contained 175 students, of which 78 were from the university setting (mean age 19 years 10 months), 48 from the vocational technical institute (mean age 19 years 6 months), and 49 from the

high school setting (mean age 17 years and 1 month). The university sample was comprised of 31 "hard sciences" students (physics, chemistry, mathematics, biology, etc.) and 47 "social studies" students (psychology, political science, social work, education, etc.). The vocational technical institute students were all social studies majors (accounting, interior design, secretarial-administrative, etc.). There was no "hard sciences" and "social studies" distinction in the high school group. The university subjects were chosen from a publicly operated state university and considered to have the highest educational selectivity. The vocational technical institute subjects were drawn from a two-year occupational training and technical education program beyond the high school level and considered to be at the intermediate level of educational selectivity. The high school group has the least educational selectivity among the three samples. Subjects in this group were students from a senior class at a local public high school. More than half of the subjects reported that they did not plan to pursue further education or training after high school graduation.

Instruments

Each subject in the present study was administered the Eysenck Personality Questionnaire (EPQ, Eysenck and Eysenck, 1975), the set 1 of the Raven's Advanced Progressive Matrices (Raven, 1965) and an information questionnaire designed by the authors. The dependent variable was the grade point average (GPA) reported by the students. The predictor variables consisted of the Extraversion-introversion, neuroticism and psychoticism scores on the EPQ, the Ravens Matrices score and the average hours of study per day reported in the information questionnaire.

The Eysenck Personality Questionnaire produces four scores of E (extraversion-introversion), N (neuroticism), P (Psychoticism) and L (lie). The E scale represents the continuum of social extraversion-introversion. High E scores are indicative of extraversion. "The typical extravert is sociable, like parties, has many friends, needs to have people to talk to, and does not like to study by himself..... The typical introvert, on the other hand, is a quiet retiring sort of person, introspective, fond of books rather than people; he is reserved and distant except with intimate friends" (Eysenck and Eysenck 1975, p. 5). The N scale represents the dimension of emotional stability-instability. High N score reflects emotional instability, anxiety-proneness, worry, feelings of restlessness and moodiness. Low N score indicates emotional stability. The stable individual is usually calm, even-tempered, controlled and unworried. The P scale represents the dimension of "tough-mindedness." The nature of the P is still unclear. Eysenck tentatively describes a high P scorer "as being solitary, not caring for people, ... lacking in feeling and empathy, and altogether insensitive." (Eysenck and Eysenck, 1975, p. 5). It is important to note that the EPQ scales, in spite of the clinical nature of the terms used, deal with normal behaviors, not with pathological symptoms. Finally, the L is a validity or lie-detection scale. In the present study subjects who received a Lie score of 6 or more were excluded from data analysis in order to prevent possible response distortion. Reliability and validity data for the E, N, P, L, Scales have been reported by (Claridge and Chappa, 1973; Eaves, 1973; Eysenck and Eysenck, 1968, 1971, 1972, 1975; Goh & Farley, 1974).

Results

The means and standard deviations for the GPA, measures of E, N, P, L, Ravens score and average hours of study per day are presented in Table 1.

Insert Table 1 About Here

As can be seen from Table 1, there were no significant differences found on the predictor variables in relation to the three educational levels except that both university and vocational technical institute students spent significantly more time ($p < .001$) in study per day than did the high school students. The means and standard deviations on the predictor measures for the university "hard sciences" and "social studies" subsamples were highly comparable. The data on E, N, P, L showed in Table 1 were very close to that reported by Eysenck and Eysenck (1975) and Farley, Goh, Sewell, Davis & Dyer (1976).

Insert Table 2 About Here

Table 2 shows the correlations of the GPA with the predictor variables. In the university "hard sciences" subsample, GPA was substantially related to both E($r=-.683$, $p < .01$) and Ravens score ($r=.389$, $p < .05$); in the "social studies" subsample, GPA was significantly related to p($r=-.244$, $p < .05$). The correlations for the three educational levels were generally small or non-significant.

Logically, it can be deducted from Eysenck's theory that extraversion should have a negative relationship with number of study hours. However,

the results did not demonstrate this relationship; the obtained correlations were consistently low and non-significant. The highest correlation between E and study hours (r=-.16, N.S.) was for the university "hard sciences" subsample.

The relationships between Ravens scroes and E, N, & P were also examined. The correlations were all very small and non-significant, strongly suggesting a lack of relationship between intelligence and the personality dimensions. The results are in accord with a substantial body of previous work (Lynn & Gordon, 196[illegible]; Naylor, 1972).

The main purpose of the study was to determine the independent contribution of the personality variables to the prediction of academic achievement. A stepwise multiple regression analysis was performed to answer this question. The results are presented in Table 3.

Insert Table 3 About Here

There were no systematic patterns of prediction over the educational levels that can be discerned. The data analysis in the university sample indicated that E proved to be the best predictor of achievement, while study hours and Ravens score also made independent contributions to the prediction. In the vocational technical institute sample, Ravens score contributed significantly to the prediction, while P and N picked up a small portion of the remaining variance. None of the predictor variables were significantly related to academic performance in the high school sample.

As far as "hard sciences" - "social studies" distinction was concerned, it was evident that the predictors functioned far more effectively for the

"hard sciences" subsample than for the "social studies" subsample. E, Ravens score, P, N, # study hours accounted for approximately 76% of the variance in academic achievement for the former, but only P had a significant but weak impact on achievement in the latter case.

Insert Table 4 About Here

Because the orthogonality of the three personality dimensions is central to Eysenck's theory, intercorrelations of the EPQ scales were computed to examine the relationships between the scales. As can be seen in Table 4, all correlations, except one (r E/N in the vocational technical institute and the high school samples) are non-significant and negligible. These results are in accord with other available data (Farley, Goh, Sewell, Davis, & Dyer, 1971).

Discussion

The present results generally support much of the previous work in this area which has demonstrated a correlation between the personality dimension of extraversion-introversion and academic achievement. However, this relationship does demonstrate a differential effect between the three educational levels examined in the present study. It is evident that introversion is of much importance in relation to academic performance in the university setting, especially in the study of "hard sciences." Thus, the present findings provide important empirical support to Eysenck's theory concerning "personality fitness" and achievement. However, it is worthy to note that despite Eysenck's contentions, this data also suggests that introversion may be important for the "social studies" students.

As no study has reported on the relationship between psychoticism and academic performance, the present findings seem to reveal meaningful information in this regard. The generally negative correlations suggest a possible impeding effect of psychoticism on achievement. Considering the characteristics of the high P scores described by Eysenck and Eysenck (1975), this result is highly in accord with theoretical expectation.

Eysenck's notion of "educational selectivity" was not supported by the study. This negative finding is rather difficult to explain as all correlations between N and GPA failed to reach significant level in the three educational settings. The relationship between neuroticism and academic achievement is unclear (Entwistle and Entwistle, 1970). It also should be noted that the three educational samples in the present study may not have differed significantly in their "educational selectivity" levels, since the university and vocational technical institute are both considered rather "local" schools and did not have extremely high standards for undergraduate admission. An interesting but non-significant trend of correlations between the "hard sciences" ($r=.20$) and "social studies" ($r=.07$) subsamples was noted. Although non-significant, this difference could be interpreted as being related to Eysenck's contention concerning "educational selectivity," which predicts a facilitating effect of N on academic performance in a more selective population. It is speculated that the "hard science" subsample indeed may be somewhat more selective than the "social studies" students as judged from their respective GPA and Raven scores. To pursue a further point of interest, we divided the university students into two groups based on the number of earned credits. We further assume that those students who have earned less than 32 credits (mostly freshman) may have less exposure to the selectivity process than those who

have earned more than 32 credit hours. When the correlations between N and GPA for the two groups (r=-.14 for the former and r=.47 for the latter) were compared, a significant difference ($p < .01$) was found in favor of the more advanced students (32 earned credits or more). In light of this analysis, we acknowledge the potential usefulness of "educational selectivity" and suggest the use of a clear, objective measure of this variable in future studies.

Finally, the three personality dimensions along with Ravens score and number of study hours in the multiple regression analyses demonstrated significant independent contributions to the prediction of academic achievement in both university and vocational technical institute settings. However, the ability of E, N & P to account for a substantial percentage of variance in educational success receives only mild support from the present data as many correlations were rather small. In view of the inconsistent contributions of E, N & P in specific educational settings and subsamples, it is suggested that different personality dimensions should be utilized in the predictions of academic performance with distinct educational groups. In this regard, "personality fitness" seems to be a useful moderator variable, while the notion of "educational selectivity" requires further research support.

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TABLE 1

Summary Statistic: Group Means and Standard Deviations

Group	n	GPA	E	N	P	L	Ravens	Study hours
University	78	2.79 (.52)	13.83 (3.51)	10.68 (3.66)	1.78 (1.69)	3.50 (1.55)	7.89 (2.26)	2.75 (1.45)
"Hard Sciences"	31	2.92 (.50)	13.85 (3.74)	9.88 (3.57)	2.23 (1.92)	3.23 (1.54)	8.23 (2.74)	2.81 (1.11)
"Social Studies"	47	2.72 (.53)	13.81 (3.31)	11.72 (3.68)	1.49 (1.50)	3.68 (1.55)	7.66 (1.06)	2.71 (1.63)
Vocational-Institute	48	3.24 (.45)	13.13 (3.34)	12.29 (3.91)	1.40 (1.57)	4.69 (1.39)	7.71 (1.88)	2.42 (1.05)
High School	49	2.84 (.66)	14.45 (2.94)	11.55 (3.75)	1.63 (1.54)	4.25 (1.61)	7.96 (1.94)	1.37 (1.14)

TABLE 2

Correlations of E, N, P, Ravens Score and Study Hours with GPA

	E	N	P	Ravens	Study Hours
University	-.244*	.035	-.113	.118	.159
"Hard Sciences	-.683**	.200	.176	.389*	-.104
"Social Studies"	-.128	.071	-.244*	.003	.203
Vocational Institute	-.062	-.169	-.310*	.317*	.007
High School	-.138	.098	-.083	-.001	.048

* $p < .05$
** $p < .01$

TABLE 3

Stepwise Multiple Regression of E, N, P, Ravens Score, and Study Hours with GPA

Group	Predictors	R	R^2	F
University	1. Extraversion	.244	.060	3.96**
	2. Study hours	.293	.086	2.86*
	3. Ravens	.319	.102	2.23*
	4. Psychoticism	.338	.114	1.87
	5. Neuroticism	.338	.115	1.47
"Hard Sciences"	1. Extraversion	.683	.466	9.59***
	2. Ravens	.769	.591	7.22***
	3. Psychoticism	.818	.669	6.07***
	4. Neuroticism	.840	.705	4.78***
	5. Study hours	.873	.762	4.49***
"Social Studies"	1. Psychoticism	.244	.060	2.85*
	2. Study hours	.312	.097	2.37
	3. Extraversion	.357	.127	2.09
Vocational Institute	1. Ravens	.318	.101	5.17**
	2. Psychoticism	.383	.146	3.86**
	3. Neuroticism	.391	.153	2.64*
	4. Study hours	.402	.162	2.08
	5. Extraversion	.418	.174	1.77
High School	1. Extraversion	.138	.019	< 1
	2. Psychoticism	.160	.026	< 1
	3. Neuroticism	.164	.027	< 1
	4. Study hours	.167	.028	<1

* $p < .10$
** $p < .05$
*** $p < .01$

TABLE 4

Intercorrelations Among EPQ Scales

Group	n	PE	PN	PL	EN	EL	NL
University	78	-.05	.05	.03	-.12	-.13	-.13
Vocational Institute	48	-.15	.16	-.08	-.23*	.02	-.02
High School	49	.01	-.07	-.08	-.29*	-.07	.08

* $p < .01$